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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/755,164	01/08/2001	Nestor A. Bojarczuk, JR.	YOR9-2000-0642	4431

21254 7590 07/03/2002  
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EXAMINER
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QUINTO, KEVIN V

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 07/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application N .

09/755,164

Applicant(s)

BOJARCZUK, ET AL.

Examiner

Kevin Quinto

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 19-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

1. In Paper No. 4, applicant elected claims 21, 23, 25, and 27 as a part of Group I. However these claims are dependent upon claim 19. Claim 19 is a part of Group II as stated in the restriction made in the prior Office action. Since claim 19 is a part of Group II and is directed towards a method of forming a field effect transistor, claims 21, 23, 25, and 27 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 4.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 11-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 11 recites the limitation "said aluminum oxide" in the last line. There is insufficient antecedent basis for this limitation in the claim. Claim 11 is dependent upon claim 1. However claim 1 does contain any limitation regarding an aluminum oxide layer.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

6. Claims 1-10 and 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishizawa et al. (USPN 4,939,571).

7. In reference to claim 1, Nishizawa et al. (USPN 4,939,571, hereinafter referred to as the “Nishizawa” reference) discloses a similar device. Figure 1 of Nishizawa discloses a field effect transistor having a substrate (5), a source (1), a drain (3) and a channel region (2). There is an insulating layer (6) disposed over the channel region (2). There is a gate electrode (4) which is disposed over the insulating layer (6). Nishizawa discloses that the insulating layer (6) contains aluminum nitride (column 2, lines 9-11).

8. In reference to claim 2, Nishizawa discloses (in column 6, lines 9-12) that the insulating layer (6) is made with “SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, or AlN, or their mixture, or their composite insulating layer.” The examiner believes that this phrase covers every combination of the stated four dielectric layers. Thus it is the examiner’s belief that this phrase meets the applicant’s limitation where the aluminum nitride is “disposed over said aluminum oxide.”

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9. In reference to claim 3, Nishizawa discloses (in column 6, lines 9-12) that the insulating layer (6) is made with "SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, or AlN, or their mixture, or their composite insulating layer." It is the examiner's belief that this phrase meets the applicant's limitation where the aluminum nitride is "disposed under said aluminum oxide."

10. In reference to claim 4, Nishizawa discloses (in column 6, lines 9-12) that the insulating layer (6) is made with "SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, or AlN, or their mixture, or their composite insulating layer." It is the examiner's belief that this phrase meets the applicant's limitation where a layer of silicon dioxide is "disposed upon said channel region, said aluminum nitride disposed over said silicon dioxide."

11. In reference to claim 5, Nishizawa discloses (in column 6, lines 9-12) that the insulating layer (6) is made with "SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, or AlN, or their mixture, or their composite insulating layer." It is the examiner's belief that this phrase meets the applicant's limitation where a layer of silicon dioxide is "disposed over said channel region, said aluminum nitride disposed under said silicon dioxide."

12. In reference to claim 6, Nishizawa discloses (in column 6, lines 9-12) that the insulating layer (6) is made with "SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, or AlN, or their mixture, or their composite insulating layer." It is the examiner's belief that this phrase meets the applicant's limitation where a layer of silicon nitride is "disposed upon said channel region, said aluminum nitride disposed over said silicon nitride."

13. In reference to claim 7, Nishizawa discloses (in column 6, lines 9-12) that the insulating layer (6) is made with "SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, or AlN, or their mixture, or their composite insulating layer." It is the examiner's belief that this phrase meets the applicant's limitation

where a layer of silicon nitride is “disposed over said channel region, said aluminum nitride disposed under said silicon nitride.”

14. In reference to claim 8, Nishizawa discloses (in column 6, lines 9-12) that the insulating layer (6) is made with “SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, or AlN, or their mixture, or their composite insulating layer.” It is the examiner’s belief that this phrase meets the applicant’s limitation where a layer of silicon dioxide is “disposed upon said aluminum nitride.”

15. In reference to claim 9, Nishizawa discloses (in column 6, lines 9-12) that the insulating layer (6) is made with “SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, or AlN, or their mixture, or their composite insulating layer.” It is the examiner’s belief that this phrase meets the applicant’s limitation where a layer of silicon dioxide is “disposed under said aluminum oxide.”

16. In reference to claim 10, Nishizawa discloses (in column 6, lines 9-12) that the insulating layer (6) is made with “SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, or AlN, or their mixture, or their composite insulating layer.” It is the examiner’s belief that this phrase meets the applicant’s limitation where a layer of silicon dioxide is “disposed over said aluminum nitride.”

17. In reference to claim 14, Nishizawa discloses a similar device. Figure 1 of Nishizawa discloses a field effect transistor having a substrate (5), a source (1), a drain (3) and a channel region (2). There is an insulating layer (6) disposed over the channel region (2). There is a gate electrode (4) which is disposed over the insulating layer (6). Nishizawa discloses (in column 6, lines 9-12) that the insulating layer (6) is made with “SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>, or AlN, or their mixture, or their composite insulating layer.” The examiner believes that this phrase covers every combination of the stated four dielectric layers. Therefore it is the examiner’s belief that this phrase meets the applicant’s limitation where there is a “first layer comprising aluminum

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oxide disposed upon said channel region and a second layer comprising aluminum nitride is disposed upon said first layer.”

18. In reference to claims 15 and 16, Nishizawa discloses a similar device. Figure 1 of Nishizawa discloses a field effect transistor having a substrate (5), a source (1), a drain (3) and a channel region (2). There is an insulating layer (6) disposed over the channel region (2). There is a gate electrode (4) which is disposed over the insulating layer (6). Nishizawa discloses that the insulating layer (6) contains aluminum nitride (column 2, lines 9-11).

19. In reference to claims 17 and 18, Nishizawa discloses such a multi-terminal device. Figure 1 of Nishizawa discloses a field effect transistor having a substrate (5), a source (1), a drain (3) and a channel region (2). There is an insulating layer (6) disposed over the channel region (2). There is a gate electrode (4) which is disposed over the insulating layer (6). Nishizawa discloses that the insulating layer (6) contains aluminum nitride (column 2, lines 9-11).

20. Claims 1, 2, 6, and 14-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Ma et al. (USPN 6,407,435 B1).

21. In reference to claim 1, Ma et al. (USPN 6,407,435 B1, hereinafter referred to as the “Ma” reference) discloses a similar device. Figure 2 of Ma discloses a field effect transistor having a substrate (112), a source (not labeled), a drain (not labeled) and a channel region (114). There is an insulating layer (130) disposed over the channel region (114). There is a gate electrode (118) which is disposed over the insulating layer (130). Ma discloses that the insulating layer (130) is aluminum nitride (column 4, lines 32-35).

22. In reference to claim 2, figure 4 of Ma describes a similar device. Figure 4 shows a field effect transistor having a substrate (112), a source (not labeled), a drain (not labeled) and a channel region (114). There is a first insulating layer (170) and a second insulating layer (130) disposed over the channel region (114). There is a gate electrode (118) which is disposed over the second insulating layer (130). Ma states that the first insulating layer (170) can be aluminum oxide (column 4, lines 66-67 and column 5, lines 1-4). Ma states that the second insulating layer (130) can be aluminum nitride (column 4, lines 32-35).

23. In reference to claim 6, Ma that the first insulating layer (170) can be silicon nitride (column 4, lines 66-67 and column 5, lines 1-4). Ma states that the second insulating layer (130) can be aluminum nitride (column 4, lines 32-35).

24. In reference to claim 14, figure 4 of Ma describes a similar device. Figure 4 shows a field effect transistor having a substrate (112), a source (not labeled), a drain (not labeled) and a channel region (114). There is a first insulating layer (170) and a second insulating layer (130) disposed over the channel region (114). There is a gate electrode (118) which is disposed over the second insulating layer (130). Ma states that the first insulating layer (170) can be aluminum oxide (column 4, lines 66-67 and column 5, lines 1-4). Ma states that the second insulating layer (130) can be aluminum nitride (column 4, lines 32-35).

25. In reference to claims 15 and 16, Ma discloses a similar device. Figure 2 of Ma discloses a field effect transistor having a substrate (112), a source (not labeled), a drain (not labeled) and a channel region (114). There is an insulating layer (130) disposed over the channel region (114). There is a gate electrode (118) which is disposed over the insulating layer (130). Ma discloses that the insulating layer (130) is aluminum nitride (column 4, lines 32-35).



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26. In reference to claims 17 and 18, Ma discloses such a multi-terminal device. Figure 2 of Ma discloses a field effect transistor having a substrate (112), a source (not labeled), a drain (not labeled) and a channel region (114). There is an insulating layer (130) disposed over the channel region (114). There is a gate electrode (118) which is disposed over the insulating layer (130). Ma discloses that the insulating layer (130) is aluminum nitride (column 4, lines 32-35).

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (703) 306-5688. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

KVQ  
June 29, 2002

NATHAN J. FLYNN  
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